Lessons Learned through Linkage Studies of Incident Cancers and Environmental Hazards in New Jersey

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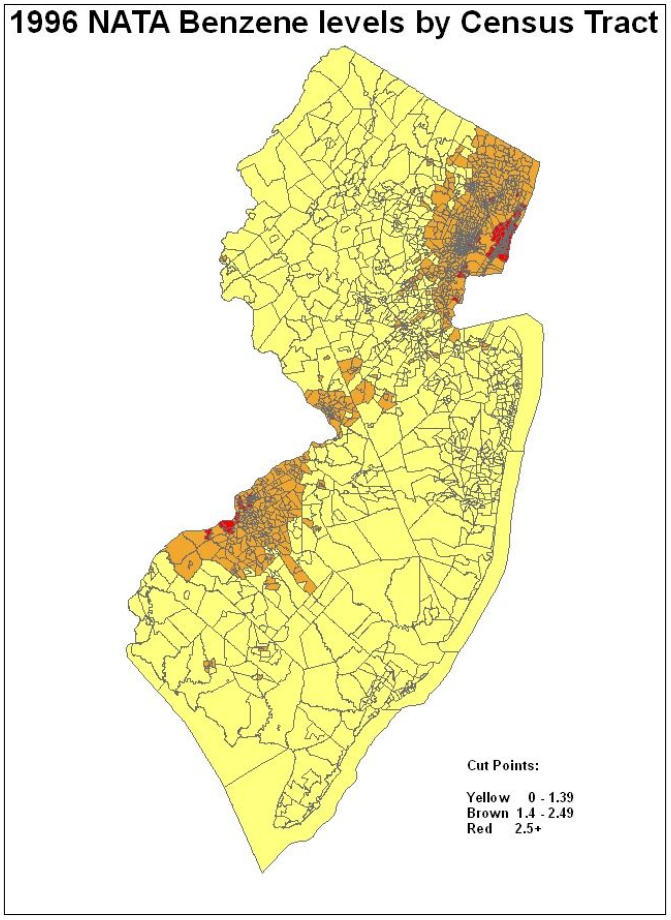
New Jersey Demonstration Project NATA and Cancer Incidence

- Benzene with leukemia
- Vinyl chloride with liver angiosarcoma
- Vinyl chloride with brain/central nervous system cancer

Demonstration Project Design

- Cases: from the NJ State Cancer Registry, 1979 through 2002
- Population: counts from US Census 1980, 1990, and 2000
- Exposure: NATA 1996, estimated average concentration in ambient air for one year by census tract
- Ecologic analysis at the census tract level (2000)
- Rate ratios for levels of air pollutant estimated with a Poisson regression model, adjusted for age, race, and poverty level

Geographic Distribution of Benzene by Selected Cut Points

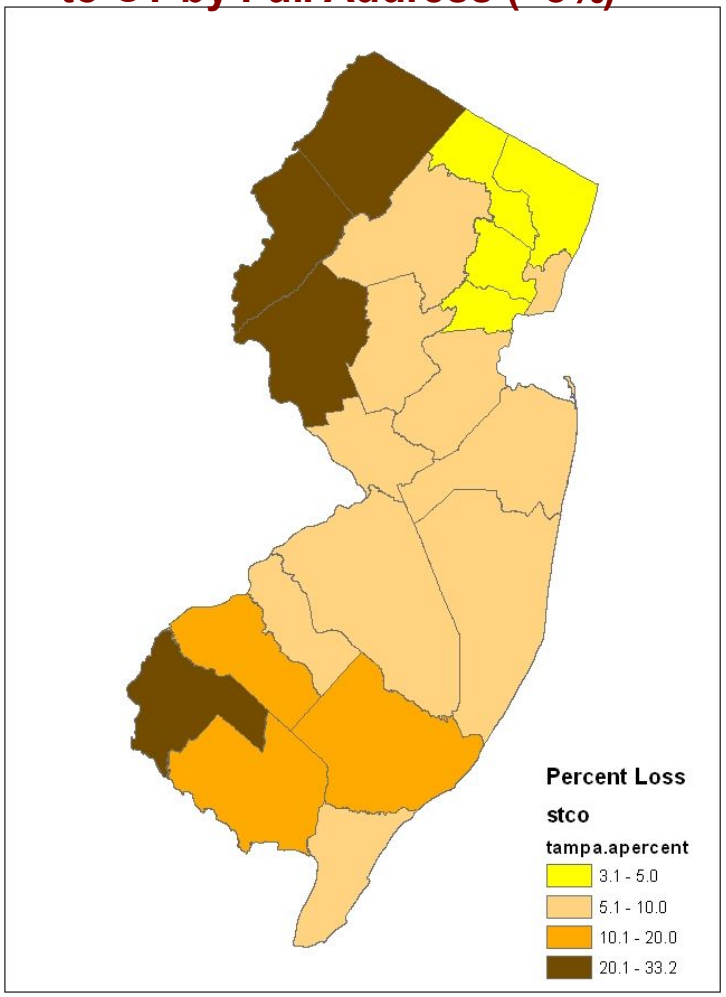


Leukemia Cases

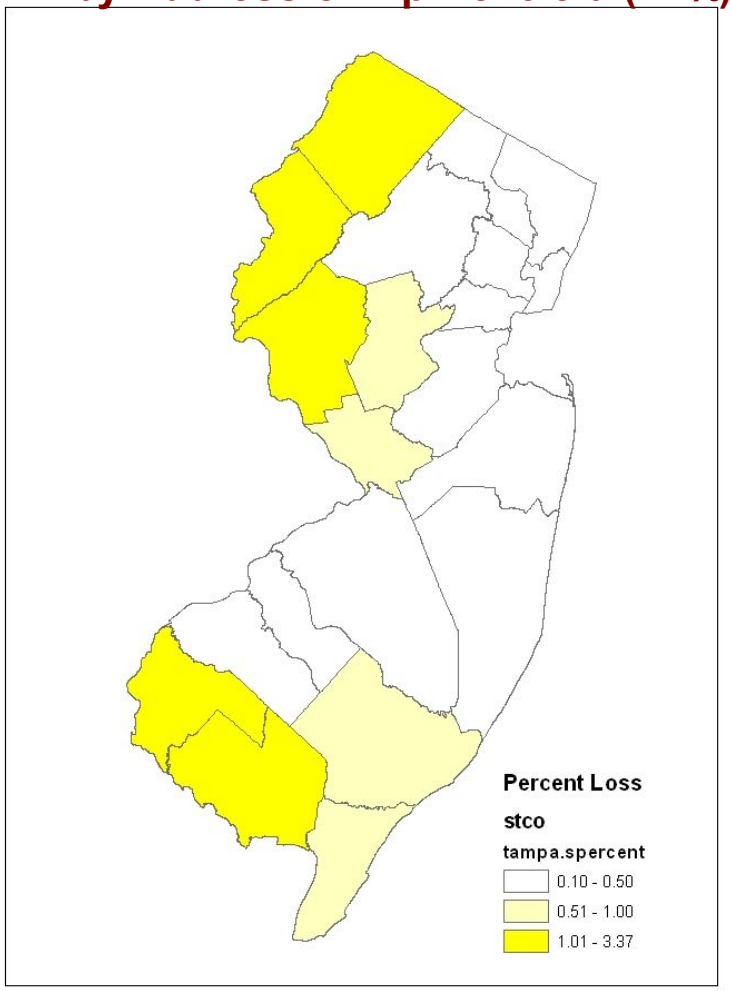
- 21,861 incident leukemia cases, excluding those from death certificate only
- Geocoding to census tract:
  - 20,131 geocoded using full address (92.1%)
  - 1,583 geocoded using zip centroid (7.2%)
  - 147 not geocoded (0.7%)

Percent Case Loss by County

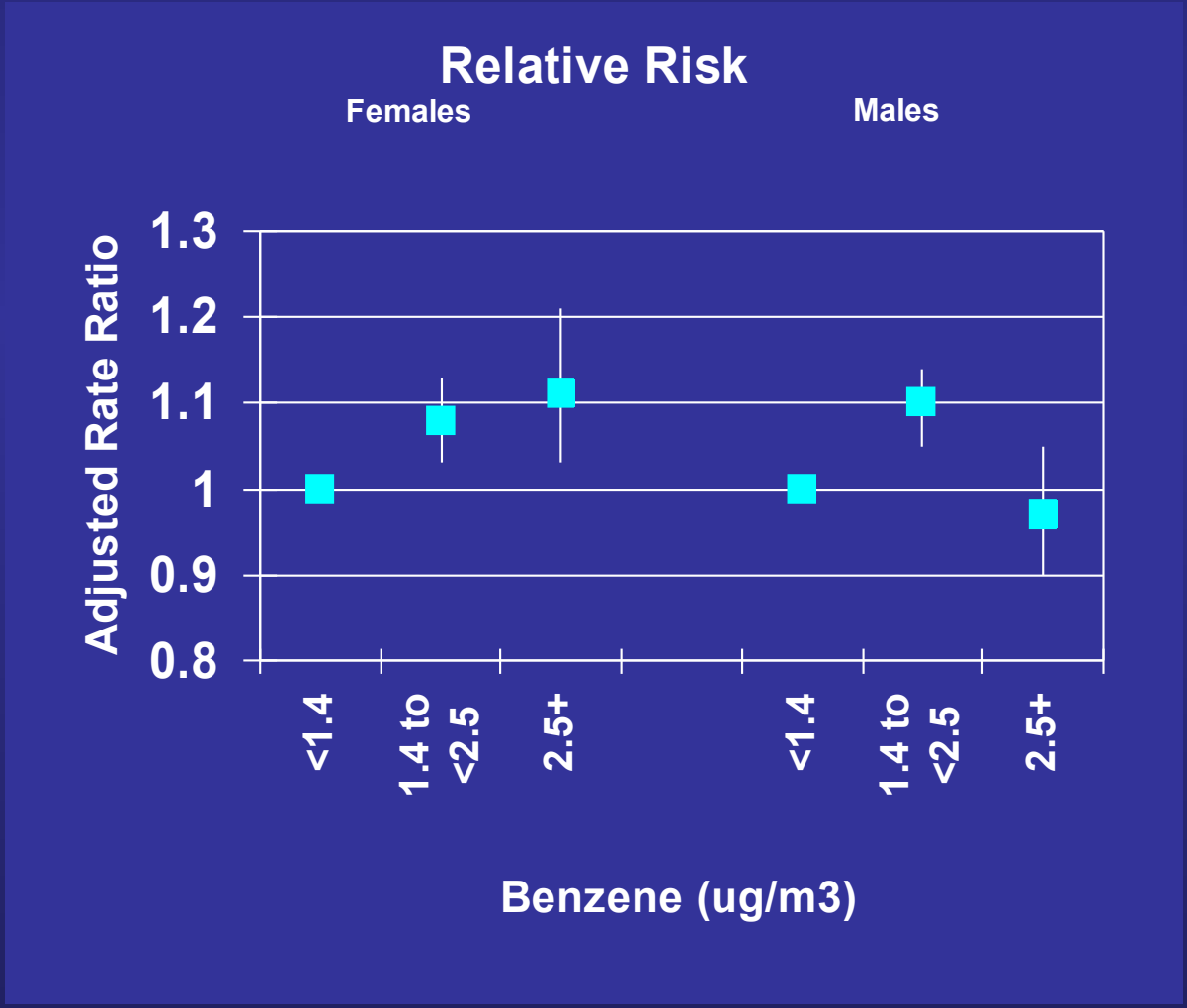
Leukemia Cases Unable to be Assigned to CT by Full Address (~8%)



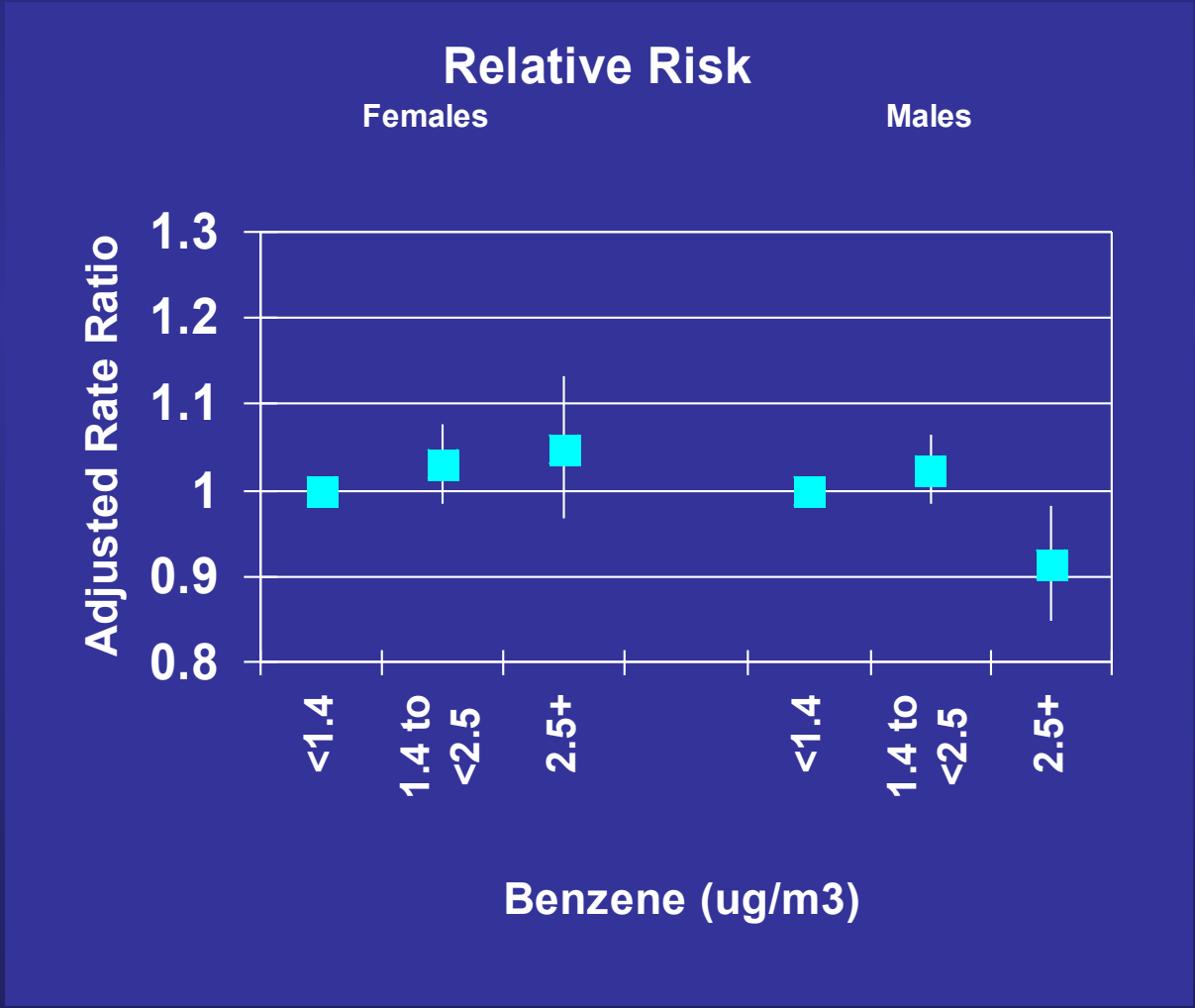
Leukemia Cases Unable to be Assigned to CT by Address or Zip Centroid (<1%)



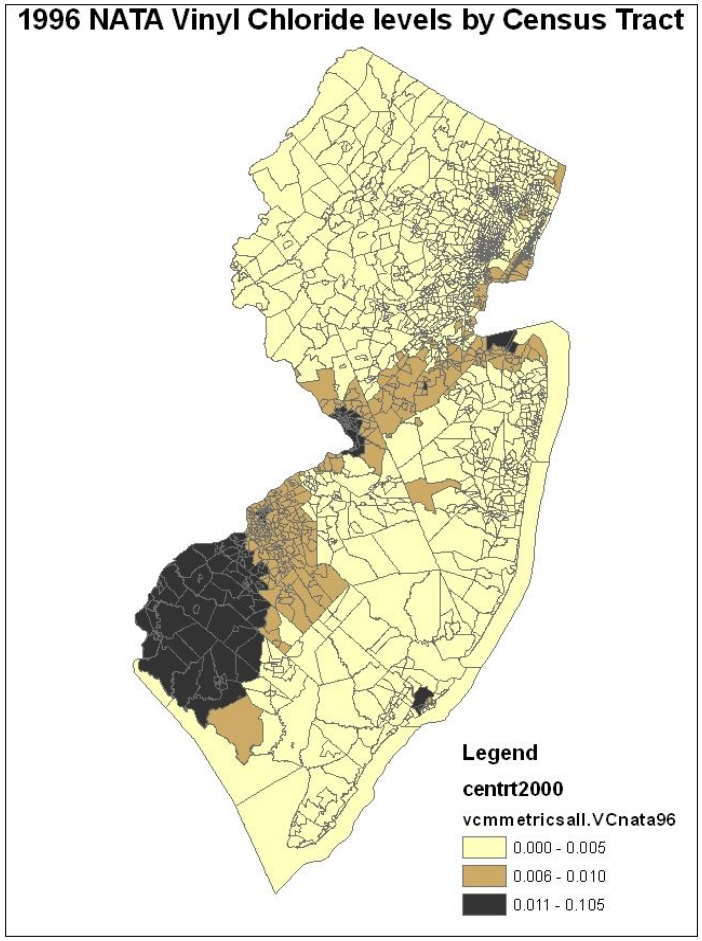
Benzene and Leukemia Incidence: Only Cases Geocoded to CT by Full Street Address

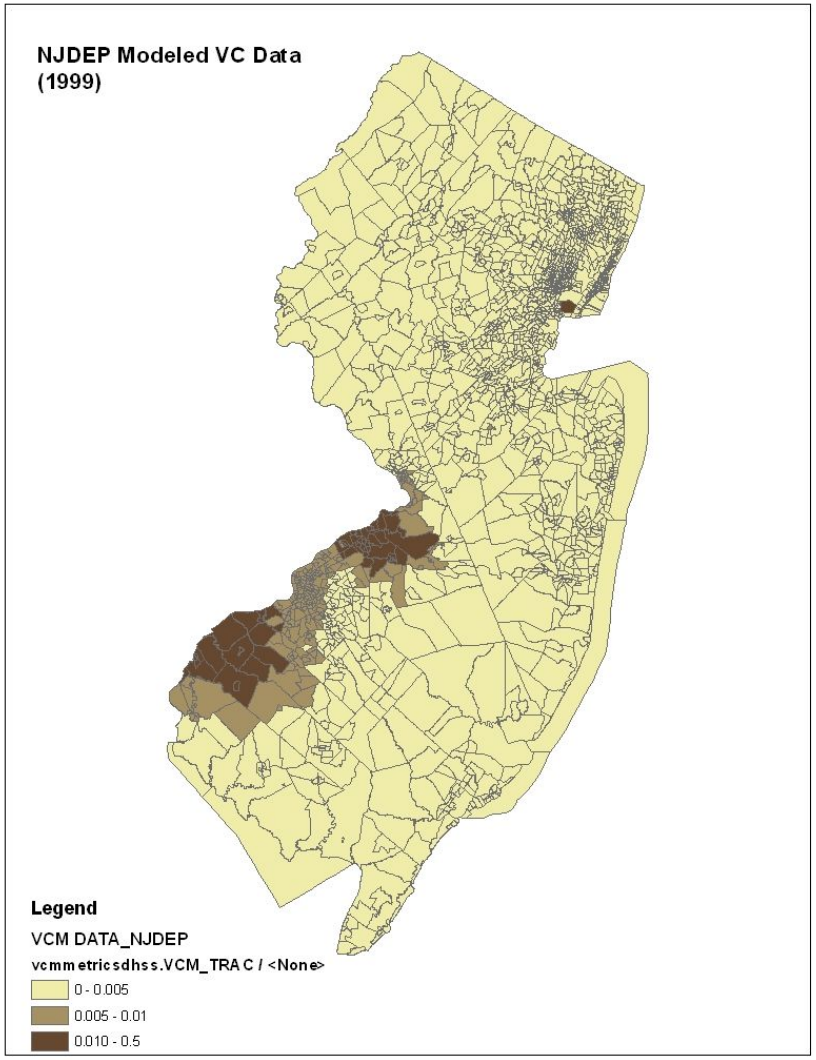


Benzene and Leukemia Incidence: Cases coded to CT by Full Address or by Zipcode Centroid

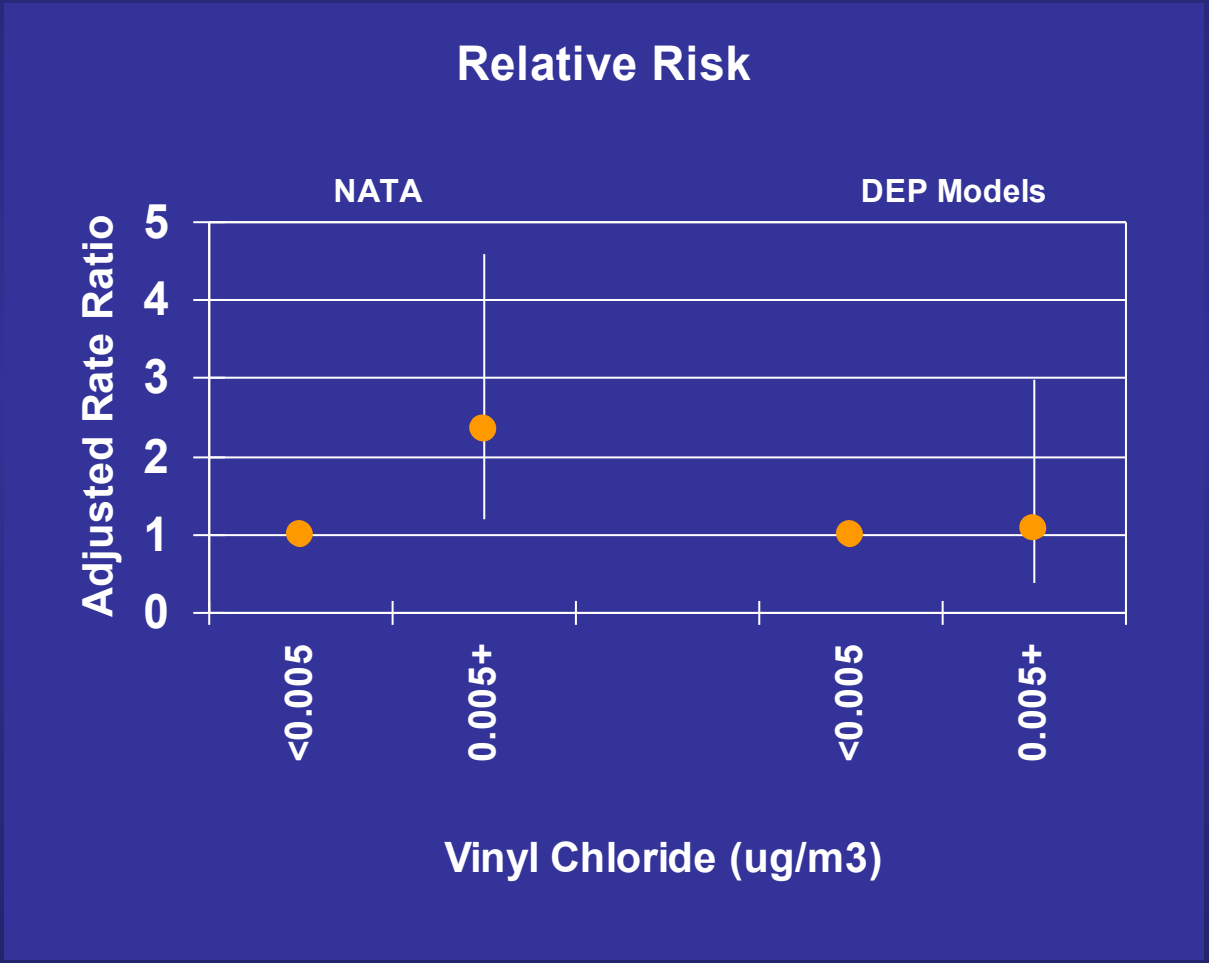


Geographic Distribution of Vinyl Chloride



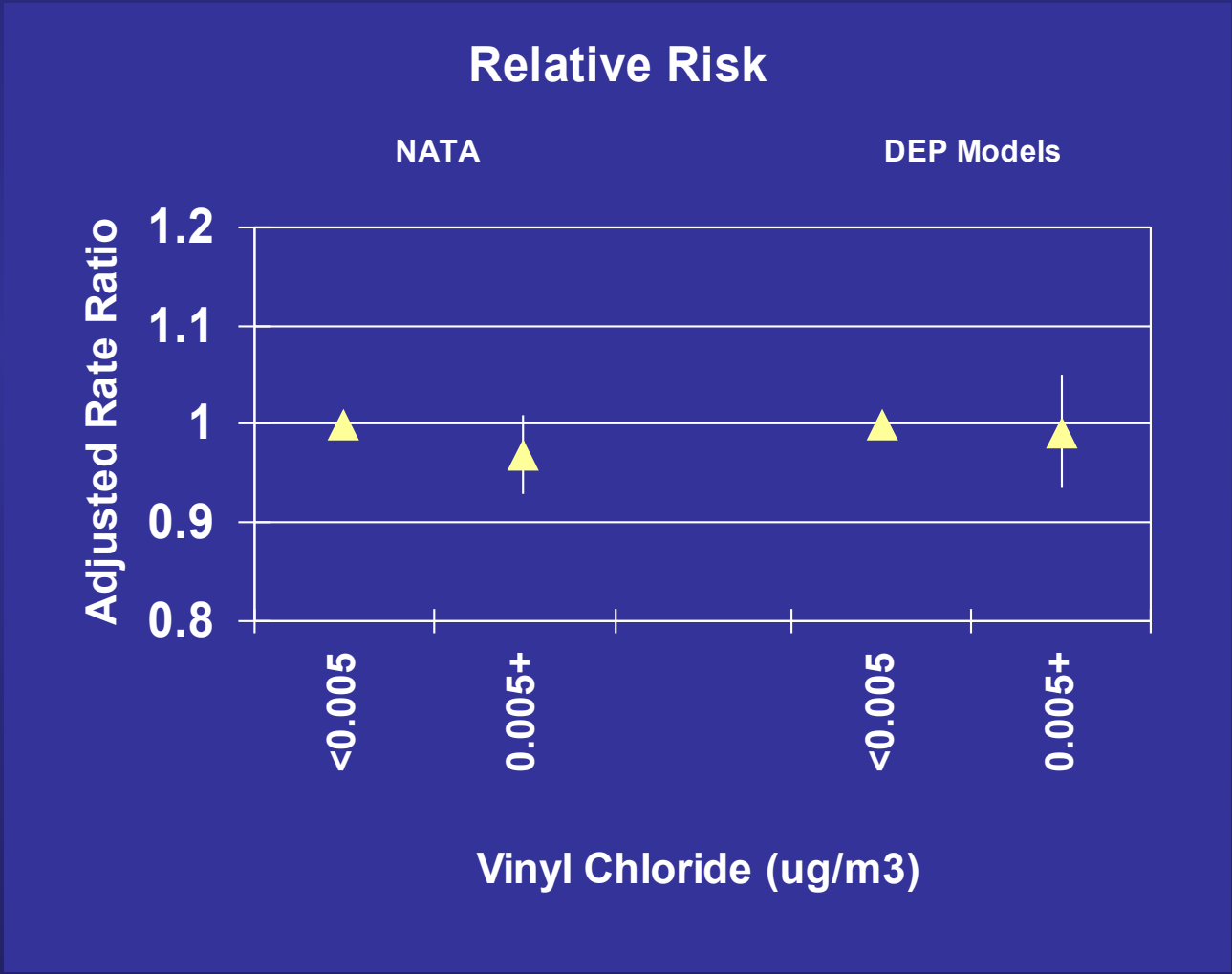


Vinyl Chloride and Angiosarcoma n= 26 Cases, All Geocoded to CT by Full Address



Vinyl Chloride and Brain Cancer

Cases coded to CT by Full Address (n=11,428) or by Zipcode Centroid (n=918)



Lessons Learned

- More Attention Must be Given to Geocoding Details by EPHT Projects:
  - Describe geocoding methods, including details on percentages of population successfully geocoded using different levels of residential address
  - Determine if loss due to geocoding is randomly distributed or if it is associated with residential location. This is especially a problem when working with rates (cases per underlying pop'n for defined area for defined time interval)
  - Consider if loss to analysis is associated with exposure

Lessons Learned (continued)

- Differential loss of cases could theoretically occur in many ways:
  - Diagnosis bias of specific doctors or hospitals
    - Example: One group of doctors are more likely to code a birth defect to a specific defect than other physicians
    - Example: A new technology that is only available a few hospitals may contribute to differential diagnosis of a specific health outcome
  - Loss due out-of-state diagnosis
    - Example: State A's cancer registry does not have a data exchange agreement with State B, and thus loss of cancer cases might occur in a geographically non-random way

Lessons Learned (continued)

- Selection of scale for environmental exposure can present challenges for EPHT projects:
  - When spatial distribution of exposure gradient varies greatly over a small geographic area, the selection of a relatively small geographical area (such as a census block) may best represent the “patchwork quilt” of exposure
  - Health outcome data however may not be best analyzed at relatively small geographical areas such as census blocks. Geocoding may not accurately locate individuals to relatively small areas such as census blocks.
  - More attention should be given to these issues by the EPHT community